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THE USE OF CORRUGATED PAPER BOARDS IN DRYING PLANTS.

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At a recent meeting of the New England Botanical Club the writer spoke briefly of a method of drying plants that he had used during the preceding season under certain particularly adverse conditions. Considerable interest in the possibilities of the method was shown by the members present, and numerous questions of a practical nature were asked as to details and results. Partly because this method appears not to be generally known, and partly because it has certain commendable time- and labor-saving features that will appeal to all active collectors, as well as to those who have but little time for the work, the following account of it is here given.

During the discussion of the matter at the meeting the fact (previously unknown to the writer) developed that at least three other members of the Club had, within two years, been using a somewhat similar method (at least as to certain details) in their own field work. Since this meeting the writer has undertaken a few experiments to determine the practical value of certain theoretically interesting details that were brought out by the discussion mentioned. It is not the purpose to enter into details of these experiments, nor into unimportant features of the drying process, but merely to explain briefly its essential points. Any collector can easily modify or elaborate these to suit certain special conditions, or to please his own whims.

The special advantages of the new method, when compared with the old, that will appeal to all whose time is very limited, are (1) that

there is no necessity of changing driers, (2) that driers need not be spread out to dry, (3) that colors of flowers and foliage are more perfectly preserved, (4) that plants which formerly took a week to dry can almost invariably be perfectly dried in less than 24 hours, and commonly in less than 12 hours.

The contrasting disadvantages are so few and unimportant that they are hardly worth mentioning. It is argued that the rapid drying contributes to brittleness, that the corrugated boards make ridges on the plants, and that bulky specimens are not easily handled. Neither of the first two have been apparent to any very noticeable extent (certainly to no serious extent) in the writer's experience, and the last is one that exists under almost any generally known method of drying plants.

To one already outfitted with the presses, driers, etc., needed for drying plants by the usual method the added expense in adopting the new one need not necessarily exceed a dollar, for a press a foot in thickness.

Under the particularly adverse conditions mentioned in the opening sentence of this article no driers were obtainable, and only a few second-hand sheets of single-faced corrugated card board. These latter were cut into sheets of the proper size, care being taken to have all the grooves run in one direction (across the press). The plants were placed, in the usual manner, in specimen sheets cut from old newspapers; one of these was laid on a corrugated board and another similar board placed on top of it. In this manner the press was built up. Wooden boards of a convenient size were used for the sides. Heavy cords tightly drawn about the press furnished the only available means of applying the pressure, but it answered all practical purposes. In building up the press care was taken to have the smooth side of each corrugated board down (or vice versa), for if odd ones were reversed the corrugations of the two adjoining sheets would interlock and cause deep grooves in the specimen between them. This press was suspended by a wire in such a way as to have the grooves of the paper boards vertical, and the press about four or five feet from the floor. A piece of unbleached cotton sheeting was sewed up in such manner as to suggest, in size and appearance, a dress skirt. By means of a draw-string at the top of this cloth it was fastened tightly about the middle of the suspended press, the bottom (about a foot from the floor) being held open by means of a

stiff wire hoop sewed in at the lower edge. Under this an ordinary lamp with a single $\frac{5}{8}$ inch wick was set on the floor and kept burning. This lamp heated the air confined under the press and inside the cloth, and drove it up through the grooves of the corrugated boards. The lamp consumed less than one cent's worth of oil in ten hours.

This is a brief description of the simple "make-shift" press that first demonstrated the advantages mentioned above. Since returning home the writer has tried certain modifications which show that somewhat better specimens can be obtained, though not so quickly dried, if the press is built up as follows; a corrugated board, a regulation drier, a specimen sheet with the inclosed plant, a drier, a corrugated board, and so on. Although the double-faced corrugated board (smooth on both surfaces) is better to handle, and can be used either side up, it appears doubtful at present if it has any particular advantages otherwise over the single-faced.

Professors M. L. Fernald and K. M. Wiegand have been using corrugated boards with excellent results for the past two seasons to ventilate their field presses. These boards were at first placed an inch or more apart in the press which was otherwise handled in much the manner that is familiar to most of us; but during the past season they were employed as described in the last paragraph, except that one change of driers was made in order to straighten folded leaves, etc. As a result Messrs. Fernald and Wiegand found it possible, in an unusually damp atmosphere, to leave their presses unattended after the first change of driers and to make prolonged collecting trips without fear that the plants left in press would be injured. Mr. J. H. Emerton has recently been using a press, with good results, in which corrugated boards and cotton wadding are the most conspicuous features. During the past summer Dr. H. S. Conard used a press very similar to the one described above in connection with his work at Cold Spring Harbor, N. Y. He spoke very enthusiastically of its merits, and some of his suggestions have been adopted here.

In all of these presses the one most important feature is the cheap and efficient ventilation furnished by the corrugated boards, thus allowing the easy and rapid dissipation of moisture, and at the same time precluding all danger of mildew or blackening under ordinary conditions. This statement also applies to presses used in foggy or humid regions. The nearer together in the press these ventilators are placed the more rapid will be the drying process, even if artificial

heat is not used. By applying artificial heat in some such manner as indicated above the drying process is greatly hastened. If one is unable to arrange the plants satisfactorily when they are first put into the press the latter can easily be left for half a day or more, and then opened and the plants rearranged finally, before artificial heat is applied.

Of the various forms or modifications of the corrugated paper board press that the writer has tried none has dried the plants so rapidly as the "emergency" press, without driers, described above. In actual use this press was almost always emptied each day and ready for the new lot of plants before they were ready for the press. It had the disadvantage, mentioned above, however, of not satisfactorily taking care of thick and bulky specimens, especially fern rootstocks, etc., unless a packing of paper, cotton wadding, or something of that sort, was used about the thick parts. This disadvantage is greatly reduced when the regular driers are used along with the corrugated sheets.

This type of press has already clearly demonstrated its great value as a time-saver not only for spermatophytes, but to an even greater extent for mosses, lichens, certain fungi, and, to a somewhat less extent, for algae and fleshy fungi. Soaking-wet sphagna have been completely dried in less than five hours, though these usually require six or more hours in the ventilated press.

More permanent and convenient, though less portable, modifications of the apparatus described above can easily be planned for home use, as has been done at the writer's home and at Brown University. At the former place a small oil stove and a wooden case are used in place of the lamp and cloth; at the latter a small electric heater, costing about \$4.00, which can be plugged into any incandescent lamp socket, is used to supply the heat. Other sources of heat may sometimes be utilized to advantage, for instance, a cook stove, a furnace register, a steam or hot water radiator, steam pipes, etc.

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